



# SEQUENCE LISTING

<110> Black, Margaret E.

<120> THYMIDINE KINASE MUTANTS AND FUSION  
PROTEINS HAVING THYMIDINE KINASE AND GUANYLATE KINASE  
ACTIVITIES

<130> 240083.429

<140> US 09/173,463

<141> 1998-10-14

<160> 121

<170> FastSEQ for Windows Version 4.0

<210> 1

<211> 1131

<212> DNA

<213> Herpesviridae sp.

<400> 1

atggcttcgt accccggcca tcaacacgcg tctgcgttcg accaggctgc gcgttctcgc 60  
ggccatagca accgacgtac ggcggtgcgc cctcgccggc agcaagaagc cacggaagtc 120  
cgcctggagc agaaaatgcc cacgctactg cgggtttata tagacgggtcc tcacgggatg 180  
gggaaaacca ccaccacgca actgctggtg gccctggggt cgcgcgacga tatcgtctac 240  
gtacccgagc cgatgactta ctggcagggt ctggggggtt ccgagacaat cgcgaaacatc 300  
tacaccacac aacaccgcct cgaccagggt gagatatcgg ccgggggacgc ggcggttgga 360  
atgacaagcg cccagataac aatgggcatg ccttatgccg tgaccgacgc cgttctgggt 420  
cctcatatcg ggggggaggc tgggagctca catgccccgc ccccgccct caccctcatc 480  
ttcgaccgcc atcccatcgc cgccctcctg tgctaccggc ccgcgcggtg ccttatgggc 540  
agcatgacc cccaggccgt gctggcggtc gtggccctca tcccgcgcac cttgcccggc 600  
accaacatcg tgcttggggc ccttcggag gacagacaca tcgaccgcct ggccaaacgc 660  
cagcgccccg gcgagcggct ggacctggct atgctggctg cgattcgccg cgtttacggg 720  
ctaacttgcca atacggtgcg gtatctgcag tgcggcggtt cgtggcggtg ggactgggga 780  
cagctttcgg ggacggccgt gccgccccag ggtgccgagc cccagagcaa cgcgggccca 840  
cgaccccata tcggggacac gttatttacc ctgtttcggg ccccgagtt gctggcccc 900  
aacggcgacc tgtataacgt gtttgccctg gccttgagc tcttgccaa acgcctccgt 960  
tccatgcacg tctttatcct ggattacgac caatcgccg ccggtgccg ggacgcctg 1020  
ctgcaactta cctccgggat ggtccagacc cacgtacca ccccggtc cataccgacg 1080  
atatgcgacc tggcgcgcac gtttgcggg gagatggggg aggctaactg a 1131

<210> 2

<211> 52

<212> DNA

<213> Artificial Sequence

<220>

<223> Oligonucleotide for generation of TK mutants

<400> 2

tgggagctca catgccccgc ccccgccct caccctcatc ttcgatcgcc at 52

<210> 3  
 <211> 56  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Oligonucleotide for generation of TK mutants

<221> misc\_feature  
 <222> (1)...(56)  
 <223> n = A,T,C or G

<400> 3  
 atgaggtacc gnnnnnnnnn nnnnnnnnnn nnnnnnnnnn nnnnatggcg atcgaa 56

<210> 4  
 <211> 17  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Primer

<400> 4  
 cccctccagc gcggtac 17

<210> 5  
 <211> 17  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Primer

<400> 5  
 cgcgctcgag gggagct 17

<210> 6  
 <211> 21  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Primer

<400> 6  
 tgggagctca catgccccgc c 21

<210> 7  
 <211> 11  
 <212> DNA  
 <213> Artificial Sequence

<220>

<223> Primer

<400> 7

atgaggtacc g

11

<210> 8

<211> 52

<212> DNA

<213> Artificial Sequence

<220>

<223> Oligonucleotide for generation TK mutants

<400> 8

tgggagctca catgccccgc ccccgccct caccctcatc ttcgacgcgc at

52

<210> 9

<211> 70

<212> DNA

<213> Artificial Sequence

<220>

<223> Oligonucleotide for generation TK mutants

<400> 9

tgggagctca catgccccgc ccccgccct caccctcatc ttcgacgcgc atcccatcgc  
cgccctcctg

60

70

<210> 10

<211> 38

<212> DNA

<213> Artificial Sequence

<220>

<223> Oligonucleotide for generation TK mutants

<400> 10

atgaggtacc gcgcagctgg gtagcacagg agggcggc

38

<210> 11

<211> 17

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 11

catgccttat gccgtga

17

<210> 12

<211> 33

<212> DNA

<213> Herpesviridae sp.

<220>

<221> CDS

<222> (1)...(33)

<400> 12

ccc atc gcc gcc ctc ctg tgc tac ccg gcc gcg  
Pro Ile Ala Ala Leu Leu Cys Tyr Pro Ala Ala  
1 5 10

33

<210> 13

<211> 11

<212> PRT

<213> Herpesviridae sp.

<400> 13

Pro Ile Ala Ala Leu Leu Cys Tyr Pro Ala Ala  
1 5 10

<210> 14

<211> 33

<212> DNA

<213> Artificial Sequence

<220>

<223> HSVTK Mutant

<221> CDS

<222> (1)...(33)

<400> 14

ccc atc gcc tcc ctc ctg tgc tac ccg gcc gcg  
Pro Ile Ala Ser Leu Leu Cys Tyr Pro Ala Ala  
1 5 10

33

<210> 15

<211> 11

<212> PRT

<213> Artificial Sequence

<220>

<223> HSVTK Mutant

<400> 15

Pro Ile Ala Ser Leu Leu Cys Tyr Pro Ala Ala  
1 5 10

<210> 16

<211> 33

<212> DNA

<213> Artificial Sequence

<220>

<223> HSVTK Mutant

<221> CDS

<222> (1)...(33)

<400> 16

tcc atc ggc gcc cta cag tgc tac ccg gtc gcg  
Ser Ile Gly Ala Leu Gln Cys Tyr Pro Val Ala  
1 5 10

33

<210> 17

<211> 11

<212> PRT

<213> Artificial Sequence

<220>

<223> HSVTK Mutant

<400> 17

Ser Ile Gly Ala Leu Gln Cys Tyr Pro Val Ala  
1 5 10

<210> 18

<211> 33

<212> DNA

<213> Artificial Sequence

<220>

<223> HSVTK Mutant

<221> CDS

<222> (1)...(33)

<400> 18

ccc atc gcc acc ctg ctg tgc tac ccg gcc gcg  
Pro Ile Ala Thr Leu Leu Cys Tyr Pro Ala Ala  
1 5 10

33

<210> 19

<211> 11

<212> PRT

<213> Artificial Sequence

<220>

<223> HSVTK Mutant

<400> 19

Pro Ile Ala Thr Leu Leu Cys Tyr Pro Ala Ala  
1 5 10

<210> 20  
 <211> 33  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<221> CDS  
 <222> (1)...(33)

<400> 20  
 ccc atc gcc gcc tta ctg tta tac ccg acc gcg  
 Pro Ile Ala Ala Leu Leu Leu Tyr Pro Thr Ala  
 1 5 10

33

<210> 21  
 <211> 11  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 21  
 Pro Ile Ala Ala Leu Leu Leu Tyr Pro Thr Ala  
 1 5 10

<210> 22  
 <211> 33  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<221> CDS  
 <222> (1)...(33)

<400> 22  
 ccc atc gcc gcc ctc gtg tgc tac ccg gcc gcg  
 Pro Ile Ala Ala Leu Val Cys Tyr Pro Ala Ala  
 1 5 10

33

<210> 23  
 <211> 11  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 23

Pro Ile Ala Ala Leu Val Cys Tyr Pro Ala Ala  
1 5 10

<210> 24

<211> 58

<212> DNA

<213> Artificial Sequence

<220>

<223> Oligonucleotide for generation of TK Mutants

<221> misc\_feature

<222> (1)...(58)

<223> n = A,T,C or G

<400> 24

tgggagctca catgccccgc ccccggccct cacnnnnnnn nnngaccgcc atcccatc 58

<210> 25

<211> 51

<212> DNA

<213> Artificial Sequence

<220>

<223> Oligonucleotide for generation of TK Mutants

<221> misc\_feature

<222> (1)...(51)

<223> n = A,T,C or G

<400> 25

ataaggtacc ggcggccgg gtagcannnn nnnnnggcga tgggatggcg g 51

<210> 26

<211> 33

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 26

actactggat ccatggcggg cccaggcct gtg 33

<210> 27

<211> 33

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 27

tactacggat cctcaggcgg cggtcctttg agc

33

<210> 28

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 28

ctgctgaaga ggctgctc

18

<210> 29

<211> 19

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 29

acacagatgc ggtttcatg

19

<210> 30

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 30

ctggacgtgg acctgcag

18

<210> 31

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 31

gttaatgatg accacatc

18

<210> 32

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer



<400> 32  
tgtaaaacga cggccagt 18

<210> 33  
<211> 18  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Primer

<400> 33  
caggaaacag ctatgacc 18

<210> 34  
<211> 21  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Primer

<400> 34  
tgtgtcccat actactacaa g 21

<210> 35  
<211> 21  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Primer

<400> 35  
tgagaactca gcagcatgct c 21

<210> 36  
<211> 18  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Primer

<400> 36  
gtgctagatg tcgaccta 18

<210> 37  
<211> 18  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Primer

<400> 37  
acctggataa agcctatg 18

<210> 38  
<211> 19  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Primer

<400> 38  
aagcaggcgc tctctctga 19

<210> 39  
<211> 18  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Primer

<400> 39  
ctatttctca tatgatgt 18

<210> 40  
<211> 18  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Primer

<400> 40  
gttacagtgt ctctagag 18

<210> 41  
<211> 24  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Primer

<400> 41  
ctaggtcctg ccatggcgtc cgcg 24

<210> 42  
<211> 27  
<212> DNA  
<213> Artificial Sequence

<220>

<223> Primer

<400> 42

actactacta gatctcgatc ccgcgaa

27

<210> 43

<211> 41

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 43

atgatgatga tgatggctgc tagccatagt atatctcctt c

41

<210> 44

<211> 39

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 44

cggcaccagg ccgctgctgt gatgatgatg atgatggct

39

<210> 45

<211> 42

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 45

agtagtatcc atggagctgc cgcgcggcac caggccgctg ct

42

<210> 46

<211> 21

<212> PRT

<213> Artificial Sequence

<220>

<223> Vector fusion peptide

<400> 46

Met Ala Ser Ser His His His His His Ser Ser Gly Leu Val Pro

1

5

10

15

Arg Gly Ser Ser Met

20

<210> 47

<211> 19

&lt;212&gt; PRT

&lt;213&gt; Herpesviridae sp.

&lt;400&gt; 47

Ala Leu Thr Leu Ile Phe Asp Arg His Pro Ile Ala Ala Leu Leu Cys  
 1 5 10 15  
 Tyr Pro Ile

&lt;210&gt; 48

&lt;211&gt; 606

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (7)...(597)

&lt;400&gt; 48

ggatcc atg gcg ggc ccc agg cct gtg gtg ctg agc ggg cct tcg gga 48  
 Met Ala Gly Pro Arg Pro Val Val Leu Ser Gly Pro Ser Gly  
 1 5 10

gct ggg aag agc acc ctg ctg aag agg ctg ctc cag gag cac agc ggc 96  
 Ala Gly Lys Ser Thr Leu Leu Lys Arg Leu Leu Gln Glu His Ser Gly  
 15 20 25 30

atc ttt ggc ttc agc gtg tcc cat acc acg agg aac ccg agg ccc ggc 144  
 Ile Phe Gly Phe Ser Val Ser His Thr Thr Arg Asn Pro Arg Pro Gly  
 35 40 45

gag gag aac ggc aaa gat tac tac ttt gta acc agg gag gtg atg cag 192  
 Glu Glu Asn Gly Lys Asp Tyr Tyr Phe Val Thr Arg Glu Val Met Gln  
 50 55 60

cgt gac ata gca gcc ggc gac ttc atc gag cat gcc gag ttc tcg ggc 240  
 Arg Asp Ile Ala Ala Gly Asp Phe Ile Glu His Ala Glu Phe Ser Gly  
 65 70 75

aac ctg tat ggc acg agc aag gtg gcg gtg cag gcc gtg cag gcc atg 288  
 Asn Leu Tyr Gly Thr Ser Lys Val Ala Val Gln Ala Val Gln Ala Met  
 80 85 90

aac cgc atc tgt gtg ctg gac gtg gac ctg cag ggt gtg cgg aac atc 336  
 Asn Arg Ile Cys Val Leu Asp Val Asp Leu Gln Gly Val Arg Asn Ile  
 95 100 105 110

aag gcc acc gat ctg cgg ccc atc tac atc tct gtg cag ccg cct tca 384  
 Lys Ala Thr Asp Leu Arg Pro Ile Tyr Ile Ser Val Gln Pro Pro Ser  
 115 120 125

ctg cac gtg ctg gag cag cgg ctg cgg cag cgc aac act gaa acc gag 432  
 Leu His Val Leu Glu Gln Arg Leu Arg Gln Arg Asn Thr Glu Thr Glu  
 130 135 140

gag agc ctg gtg aag cgg ctg gct gct gcc cag gcc gac atg gag agc 480  
 Glu Ser Leu Val Lys Arg Leu Ala Ala Ala Gln Ala Asp Met Glu Ser  
           145                          150                          155

agc aag gag ccc ggc ctg ttt gat gtg gtc atc att aac gac agc ctg 528  
 Ser Lys Glu Pro Gly Leu Phe Asp Val Val Ile Ile Asn Asp Ser Leu  
           160                          165                          170

gac cag gcc tac gca gag ctg aag gag gcg ctc tct gag gaa atc aag 576  
 Asp Gln Ala Tyr Ala Glu Leu Lys Glu Ala Leu Ser Glu Glu Ile Lys  
           175                          180                          185                          190

aaa gct caa agg acc ggc gcc tgaggatcc 606  
 Lys Ala Gln Arg Thr Gly Ala  
                           195

<210> 49  
 <211> 197  
 <212> PRT  
 <213> Homo sapiens

<400> 49  
 Met Ala Gly Pro Arg Pro Val Val Leu Ser Gly Pro Ser Gly Ala Gly  
   1                          5                          10                          15  
 Lys Ser Thr Leu Leu Lys Arg Leu Leu Gln Glu His Ser Gly Ile Phe  
           20                          25                          30  
 Gly Phe Ser Val Ser His Thr Thr Arg Asn Pro Arg Pro Gly Glu Glu  
           35                          40                          45  
 Asn Gly Lys Asp Tyr Tyr Phe Val Thr Arg Glu Val Met Gln Arg Asp  
   50                          55                          60  
 Ile Ala Ala Gly Asp Phe Ile Glu His Ala Glu Phe Ser Gly Asn Leu  
  65                          70                          75                          80  
 Tyr Gly Thr Ser Lys Val Ala Val Gln Ala Val Gln Ala Met Asn Arg  
           85                          90                          95  
 Ile Cys Val Leu Asp Val Asp Leu Gln Gly Val Arg Asn Ile Lys Ala  
          100                         105                         110  
 Thr Asp Leu Arg Pro Ile Tyr Ile Ser Val Gln Pro Pro Ser Leu His  
          115                         120                         125  
 Val Leu Glu Gln Arg Leu Arg Gln Arg Asn Thr Glu Thr Glu Glu Ser  
          130                         135                         140  
 Leu Val Lys Arg Leu Ala Ala Ala Gln Ala Asp Met Glu Ser Ser Lys  
  145                         150                         155                         160  
 Glu Pro Gly Leu Phe Asp Val Val Ile Ile Asn Asp Ser Leu Asp Gln  
          165                         170                         175  
 Ala Tyr Ala Glu Leu Lys Glu Ala Leu Ser Glu Glu Ile Lys Lys Ala  
          180                         185                         190  
 Gln Arg Thr Gly Ala  
          195

<210> 50  
 <211> 660  
 <212> DNA

&lt;213&gt; Mus musculus

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (25)...(618)

&lt;400&gt; 50

ctggggtcggg tccccgcgga cggc atg gca gga cct agg cca gta gtg ctg	51
Met Ala Gly Pro Arg Pro Val Val Leu	
1 5	
agc ggg ccg tca ggg gca ggg aag agc act ctg ctc aag aag ctg ttc	99
Ser Gly Pro Ser Gly Ala Gly Lys Ser Thr Leu Leu Lys Lys Leu Phe	
10 15 20 25	
cag gag cac agc agc atc ttc ggc ttc agt gtg tcc cat act aca agg	147
Gln Glu His Ser Ser Ile Phe Gly Phe Ser Val Ser His Thr Thr Arg	
30 35 40	
aac cca cga cct ggt gaa gaa gat ggc aaa gat tac tac ttt gtg acc	195
Asn Pro Arg Pro Gly Glu Glu Asp Gly Lys Asp Tyr Tyr Phe Val Thr	
45 50 55	
agg gag atg atg cag cgt gat att gca gca ggg gac ttc att gag cat	243
Arg Glu Met Met Gln Arg Asp Ile Ala Ala Gly Asp Phe Ile Glu His	
60 65 70	
gct gag ttc tca ggg aac ctg tac ggg aca agc aag gaa gct gtt cgg	291
Ala Glu Phe Ser Gly Asn Leu Tyr Gly Thr Ser Lys Glu Ala Val Arg	
75 80 85	
gct gtg cag gcc atg aac cgc atc tgc gtg cta gat gtc gac cta caa	339
Ala Val Gln Ala Met Asn Arg Ile Cys Val Leu Asp Val Asp Leu Gln	
90 95 100 105	
ggc gtg cgc agc atc aag aag act gat ctg tgt ccc atc tac atc ttt	387
Gly Val Arg Ser Ile Lys Lys Thr Asp Leu Cys Pro Ile Tyr Ile Phe	
110 115 120	
gtg cag cct ccc tcg ctg gac gtg ctg gag caa cga ctg cga ctg cgc	435
Val Gln Pro Pro Ser Leu Asp Val Leu Glu Gln Arg Leu Arg Leu Arg	
125 130 135	
aac act gag act gag gag agt ctg gca aag cgg ctg gca gct gca cgg	483
Asn Thr Glu Thr Glu Glu Ser Leu Ala Lys Arg Leu Ala Ala Ala Arg	
140 145 150	
aca gac atg gag agc agc aag gag cct ggc ttg ttt gac ctg gtg atc	531
Thr Asp Met Glu Ser Ser Lys Glu Pro Gly Leu Phe Asp Leu Val Ile	
155 160 165	
atc aat gac gac ctg gat aaa gcc tat gca acc ctg aag cag gcg ctc	579
Ile Asn Asp Asp Leu Asp Lys Ala Tyr Ala Thr Leu Lys Gln Ala Leu	
170 175 180 185	

tct gag gaa atc aag aaa gca cag gga act ggc cac gcc tgaaggcctg 628  
 Ser Glu Glu Ile Lys Lys Ala Gln Gly Thr Gly His Ala  
                   190                                  195

cttcattcca cagagtgatg tctgtgtct aa 660

<210> 51  
 <211> 198  
 <212> PRT  
 <213> Mus musculus

<400> 51  
 Met Ala Gly Pro Arg Pro Val Val Leu Ser Gly Pro Ser Gly Ala Gly  
   1                  5                  10                  15  
 Lys Ser Thr Leu Leu Lys Lys Leu Phe Gln Glu His Ser Ser Ile Phe  
                   20                  25                  30  
 Gly Phe Ser Val Ser His Thr Thr Arg Asn Pro Arg Pro Gly Glu Glu  
                   35                  40                  45  
 Asp Gly Lys Asp Tyr Tyr Phe Val Thr Arg Glu Met Met Gln Arg Asp  
                   50                  55                  60  
 Ile Ala Ala Gly Asp Phe Ile Glu His Ala Glu Phe Ser Gly Asn Leu  
   65                  70                  75                  80  
 Tyr Gly Thr Ser Lys Glu Ala Val Arg Ala Val Gln Ala Met Asn Arg  
                   85                  90                  95  
 Ile Cys Val Leu Asp Val Asp Leu Gln Gly Val Arg Ser Ile Lys Lys  
                   100                  105                  110  
 Thr Asp Leu Cys Pro Ile Tyr Ile Phe Val Gln Pro Pro Ser Leu Asp  
   115                  120                  125  
 Val Leu Glu Gln Arg Leu Arg Leu Arg Asn Thr Glu Thr Glu Glu Ser  
                   130                  135                  140  
 Leu Ala Lys Arg Leu Ala Ala Ala Arg Thr Asp Met Glu Ser Ser Lys  
   145                  150                  155                  160  
 Glu Pro Gly Leu Phe Asp Leu Val Ile Ile Asn Asp Asp Leu Asp Lys  
                   165                  170                  175  
 Ala Tyr Ala Thr Leu Lys Gln Ala Leu Ser Glu Glu Ile Lys Lys Ala  
                   180                  185                  190  
 Gln Gly Thr Gly His Ala  
                   195

<210> 52  
 <211> 16  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Primer

<400> 52  
 tccccacact ccaggc

<210> 53  
 <211> 18  
 <212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 53

ctcagtgttg cccagtcg

18

<210> 54

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 54

gccgaagatg ctgctgtg

18

<210> 55

<211> 33

<212> DNA

<213> Artificial Sequence

<220>

<223> HSVTK Mutant

<221> CDS

<222> (1)...(33)

<400> 55

ccc atc gcc gcc ctc atc tgc tac ccg gcc gcg  
Pro Ile Ala Ala Leu Ile Cys Tyr Pro Ala Ala  
1 5 10

33

<210> 56

<211> 11

<212> PRT

<213> Artificial Sequence

<220>

<223> HSVTK Mutant

<400> 56

Pro Ile Ala Ala Leu Ile Cys Tyr Pro Ala Ala  
1 5 10

<210> 57

<211> 33

<212> DNA

<213> Artificial Sequence

<220>



<223> HSVTK Mutant

<221> CDS

<222> (1)...(33)

<400> 57

cac atc tcg gcc ctc ctg tgc tac ccg gtc gcg  
His Ile Ser Ala Leu Leu Cys Tyr Pro Val Ala  
1 5 10

33

<210> 58

<211> 11

<212> PRT

<213> Artificial Sequence

<220>

<223> HSVTK Mutant

<400> 58

His Ile Ser Ala Leu Leu Cys Tyr Pro Val Ala  
1 5 10

<210> 59

<211> 72

<212> DNA

<213> Herpesviridae sp.

<220>

<221> CDS

<222> (1)...(72)

<400> 59

tca cat gcc ccg ccc ccg gcc ctc acc ctc atc ttc gac cgc cat ccc  
Ser His Ala Pro Pro Pro Ala Leu Thr Leu Ile Phe Asp Arg His Pro  
1 5 10 15

48

atc gcc gcc ctc ctg tgc tac ccg  
Ile Ala Ala Leu Leu Cys Tyr Pro  
20

72

<210> 60

<211> 24

<212> PRT

<213> Herpesviridae sp.

<400> 60

Ser His Ala Pro Pro Pro Ala Leu Thr Leu Ile Phe Asp Arg His Pro  
1 5 10 15  
Ile Ala Ala Leu Leu Cys Tyr Pro  
20

<210> 61

<211> 72  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 61  
 tcacatgtcc cgcccccggc cctcaccatt ttggctgacc gccatcccat cgccgcatat 60  
 ttatgctacc cg 72

<210> 62  
 <211> 72  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 62  
 tcacatgccc cgccccctgc cctcaccgta ataacagacc gccatcccat cgccctgcctg 60  
 ctttgctacc cg 72

<210> 63  
 <211> 72  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 63  
 tcacatgccc cgcccccggc cctcaccta ctactggacc gccatcccat cgccgtgatg 60  
 ctatgctacc cg 72

<210> 64  
 <211> 72  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 64  
 tcacatgccc cgcccccgtc cctcaccttg atcctggacc gccatcccat cgccagctac 60  
 tgttgctacc cg 72

<210> 65  
 <211> 72  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 65  
 tcacatgccc cgcccccggc cctcaccatg ttcatggacc gccatcccat cgcccataat 60  
 gtatgctacc cg 72

<210> 66  
 <211> 66  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 66  
 tcacatgccc cgcccctcac catattgctt gaccgccatc ccacgcgaat ttacttatgc 60  
 taccgc 66

<210> 67  
 <211> 69  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 67  
 tcacatgccc cgccggccct caccttttat tatgaccgcc atcccatcgc cccttttggt 60  
 tgctaccgc 69

<210> 68  
 <211> 72  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 68  
 tcacatgccc cgcccccggc cctcaccttg ttcctcgacc gccatcccat cgccctcatg 60  
 tggtgctacc cg 72

<210> 69  
 <211> 69  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 69  
 tcacatgccc cgccccccct caccctcgta ttagaccgtc atcccatcgc ctactatcta 60  
 tgctaccct 69

<210> 70

<211> 69  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 70  
 tcacatgccc cgccggcct cacctgtttt ctcgaccgcc atcccatcgc ctattatctt 60  
 tgctaccgc 69

<210> 71  
 <211> 15  
 <212> PRT  
 <213> Herpesviridae sp.

<400> 71  
 Leu Ile Phe Asp Arg His Pro Ile Ala Ala Leu Leu Cys Tyr Pro  
 1 5 10 15

<210> 72  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 72  
 Leu Val Phe Asp Arg His Pro Ile Ala Thr Leu Leu Cys Tyr Pro  
 1 5 10 15

<210> 73  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 73  
 Phe Ile Phe Asp Arg His Pro Ile Ala Tyr Tyr Ile Cys Tyr Pro  
 1 5 10 15

<210> 74  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 74  
 Val Leu Ser Asp Arg His Pro Ile Ala Arg Ile Tyr Cys Tyr Pro

1	5	10	15
---	---	----	----

<210> 75  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 75  
 Leu Ile Leu Asp Arg His Pro Ile Ala Asn Phe Ile Cys Tyr Pro  
 1 5 10 15

<210> 76  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 76  
 Thr Phe Tyr Asp Arg His Pro Ile Ala Trp Met Phe Cys Tyr Pro  
 1 5 10 15

<210> 77  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 77  
 Val Val Cys Asp Arg His Pro Ile Ala Cys Thr Leu Cys Tyr Pro  
 1 5 10 15

<210> 78  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 78  
 Leu Phe Ala Asp Arg His Pro Ile Ala Thr Leu Leu Cys Tyr Pro  
 1 5 10 15

<210> 79  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence

<220>

<223> HSVTK Mutant

<400> 79

Val Phe Ser Asp Arg His Pro Ile Ala Leu Leu Leu Cys Tyr Pro  
1 5 10 15

<210> 80

<211> 15

<212> PRT

<213> Artificial Sequence

<220>

<223> HSVTK Mutant

<400> 80

Leu Cys Phe Asp Arg His Pro Ile Ala Tyr Cys Ile Cys Tyr Pro  
1 5 10 15

<210> 81

<211> 15

<212> PRT

<213> Artificial Sequence

<220>

<223> HSVTK Mutant

<400> 81

Ile Ile Ala Asp Arg His Pro Ile Ala Leu Leu Val Cys Tyr Pro  
1 5 10 15

<210> 82

<211> 15

<212> PRT

<213> Artificial Sequence

<220>

<223> HSVTK Mutant

<400> 82

Leu Ile Leu Asp Arg His Pro Ile Ala Val Ser Leu Cys Tyr Pro  
1 5 10 15

<210> 83

<211> 15

<212> PRT

<213> Artificial Sequence

<220>

<223> HSVTK Mutant

<400> 83

Leu Leu His Asp Arg His Pro Ile Ala Val Cys Val Cys Tyr Pro

1	5	10	15
---	---	----	----

<210> 84  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence  
  
 <220>  
 <223> HSVTK Mutant  
  
 <400> 84  
 Leu Leu Ser Asp Arg His Pro Ile Ala Tyr His Leu Cys Tyr Pro  
 1 5 10 15  
  
 <210> 85  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence  
  
 <220>  
 <223> HSVTK Mutant  
  
 <400> 85  
 Phe Leu Val Asp Arg His Pro Ile Ala Trp Asn Leu Cys Tyr Pro  
 1 5 10 15  
  
 <210> 86  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence  
  
 <220>  
 <223> HSVTK Mutant  
  
 <400> 86  
 Thr Val Phe Asp Arg His Pro Ile Ala Ser Thr Phe Cys Tyr Pro  
 1 5 10 15  
  
 <210> 87  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence  
  
 <220>  
 <223> HSVTK Mutant  
  
 <400> 87  
 Leu Thr Phe Asp Arg His Pro Ile Ala Gly Thr Leu Cys Tyr Pro  
 1 5 10 15  
  
 <210> 88  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence

<220>

<223> HSVTK Mutant

<400> 88

Leu Phe Ile Asp Arg His Pro Ile Ala Thr Ile Leu Cys Tyr Pro  
1 5 10 15

<210> 89

<211> 15

<212> PRT

<213> Artificial Sequence

<220>

<223> HSVTK Mutant

<400> 89

Val Ala Ala Asp Arg His Pro Ile Ala Phe Ser Tyr Cys Tyr Pro  
1 5 10 15

<210> 90

<211> 15

<212> PRT

<213> Artificial Sequence

<220>

<223> HSVTK Mutant

<400> 90

Pro Thr Gln Asp Arg His Pro Ile Ala Ser Asp Pro Cys Tyr Pro  
1 5 10 15

<210> 91

<211> 15

<212> PRT

<213> Artificial Sequence

<220>

<223> HSVTK Mutant

<400> 91

Arg Ala Phe Asp Arg His Pro Ile Gly Gln Thr Ser Cys Tyr Pro  
1 5 10 15

<210> 92

<211> 15

<212> PRT

<213> Artificial Sequence

<220>

<223> HSVTK Mutant

<400> 92

Asp Gly Val Asp Arg His Pro Ile Ala Cys Arg His Cys Tyr Pro



1	5	10	15
---	---	----	----

<210> 93  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence  
  
 <220>  
 <223> HSVTK Mutant  
  
 <400> 93  
 Asp Asn Asn Asp Arg His Pro Ile Ala Gln Ser Pro Cys Tyr Pro  
 1                      5                      10                      15

<210> 94  
 <211> 11  
 <212> PRT  
 <213> Artificial Sequence  
  
 <220>  
 <223> HSVTK Mutant  
  
 <400> 94  
 Ile Leu Asn Asp Arg His Pro Ile Ala Arg Thr  
 1                      5                      10

<210> 95  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence  
  
 <220>  
 <223> HSVTK Mutant  
  
 <400> 95  
 Phe Leu Asp Asp Arg His Pro Ile Ala Pro Leu Leu Cys Tyr Pro  
 1                      5                      10                      15

<210> 96  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence  
  
 <220>  
 <223> HSVTK Mutant  
  
 <400> 96  
 Tyr Tyr Val Asp Arg His Pro Ile Ala Val Ser Leu Cys Tyr Pro  
 1                      5                      10                      15

<210> 97  
 <211> 12  
 <212> PRT  
 <213> Artificial Sequence

<220>

<223> HSVTK Mutant

<400> 97

Asp Arg His Pro Ile Ala Leu Arg Ser Cys Asn Pro  
1 5 10

<210> 98

<211> 15

<212> PRT

<213> Artificial Sequence

<220>

<223> HSVTK Mutant

<400> 98

Leu Asn Pro Asp Arg His Pro Ile Ala Cys Asp Cys Cys Tyr Pro  
1 5 10 15

<210> 99

<211> 12

<212> PRT

<213> Artificial Sequence

<220>

<223> HSVTK Mutant

<400> 99

Ser Trp Gly Asp Arg His Pro Ile Glu Lys Phe Ile  
1 5 10

<210> 100

<211> 15

<212> PRT

<213> Artificial Sequence

<220>

<223> HSVTK Mutant

<400> 100

Tyr Gly Ser Asp Arg His Pro Ile Ala Ile Cys Pro Cys Tyr Pro  
1 5 10 15

<210> 101

<211> 8

<212> PRT

<213> Artificial Sequence

<220>

<223> HSVTK Mutant

<400> 101

Asp Arg His Pro Ile Ala Ile Ile

1 5

<210> 102  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 102  
 Tyr Tyr Asn Asp Arg His Pro Ile Ala Gly Ser Pro Cys Tyr Pro  
 1 5 10 15

<210> 103  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 103  
 Trp Gly Arg Asp Arg His Pro Ile Ala Asn Leu Leu Cys Tyr Pro  
 1 5 10 15

<210> 104  
 <211> 15  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 104  
 Arg Leu Pro Asp Arg His Pro Ile Ala Asn Glu Ala Cys Tyr Pro  
 1 5 10 15

<210> 105  
 <211> 12  
 <212> PRT  
 <213> Herpesviridae sp.

<400> 105  
 Leu Ile Phe Asp Arg His Pro Ile Ala Ala Leu Leu  
 1 5 10

<210> 106  
 <211> 12  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 106  
 Leu Phe Leu Asp Arg His Pro Ile Ala Phe Asn Leu  
 1 5 10

<210> 107  
 <211> 12  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 107  
 Leu Phe Ala Asp Arg His Pro Ile Ala Phe Leu Leu  
 1 5 10

<210> 108  
 <211> 12  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 108  
 Ile Phe Leu Asp Arg His Pro Ile Ala Phe Met Leu  
 1 5 10

<210> 109  
 <211> 12  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 109  
 Ile Leu Leu Asp Arg His Pro Ile Ala Tyr Leu Leu  
 1 5 10

<210> 110  
 <211> 12  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 110  
 Leu Phe Ala Asp Arg His Pro Ile Ala Tyr Tyr Leu  
 1 5 10

<210> 111

<211> 12  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 111  
 Leu Phe Val Asp Arg His Pro Ile Ala Val Met Leu  
 1 5 10

<210> 112  
 <211> 12  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> HSVTK Mutant

<400> 112  
 Ile Phe Val Asp Arg His Pro Ile Ala Phe Tyr Leu  
 1 5 10

<210> 113  
 <211> 21  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Primer

<400> 113  
 gtctcggagg cgcccagcac c

21

<210> 114  
 <211> 59  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Oligonucleotide used to generate TK mutants

<400> 114  
 aggctgggag ctacatgcc ccgccccgg ccctcaccac tcttgccct cgaccgcca

59

<210> 115  
 <211> 54  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Oligonucleotide used to generate TK mutants

<400> 115

ataaggtacc gcgcggccgg gtagcacaga catgtacagg cgatgggatg gcgg 54

<210> 116

<211> 55

<212> DNA

<213> Artificial Sequence

<220>

<223> Oligonucleotide used to generate TK mutants

<400> 116

cgccctcgacc agggtgagat atcggccggg gacgcggcgg tggtaatgac aagcg 55

<210> 117

<211> 58

<212> DNA

<213> Artificial Sequence

<220>

<223> Oligonucleotide used to generate TK mutants

<400> 117

gaacggcgtc ggtcacggca taaggcatgc ccattgttat ctgggcgctt gtcattac 58

<210> 118

<211> 60

<212> DNA

<213> Artificial Sequence

<220>

<223> Oligonucleotide used to generate TK mutants

<400> 118

ggcgccctccg agacaatcgc gaacatctac accacacaac accgcctcga ccagggtgag 60

<210> 119

<211> 59

<212> DNA

<213> Artificial Sequence

<220>

<223> Oligonucleotide used to generate TK mutants

<400> 119

tcgactgagc tcccagcctc ccccccgata tgaggagcca gaacggcgtc ggtcacggc 59

<210> 120

<211> 24

<212> DNA

<213> Artificial Sequence

<220>

<223> Oligonucleotide used to generate TK mutants

<400> 120  
gcagctggcg cctccgagac aatc

24

<210> 121  
<211> 19  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Oligonucleotide used to generate TK mutants

<400> 121  
tcgactgagc tcccagcct

19

B11  
Cont